Western
AREA POWER
ADMINISTRATION

Solic. No. DE-FB65-10WN85330
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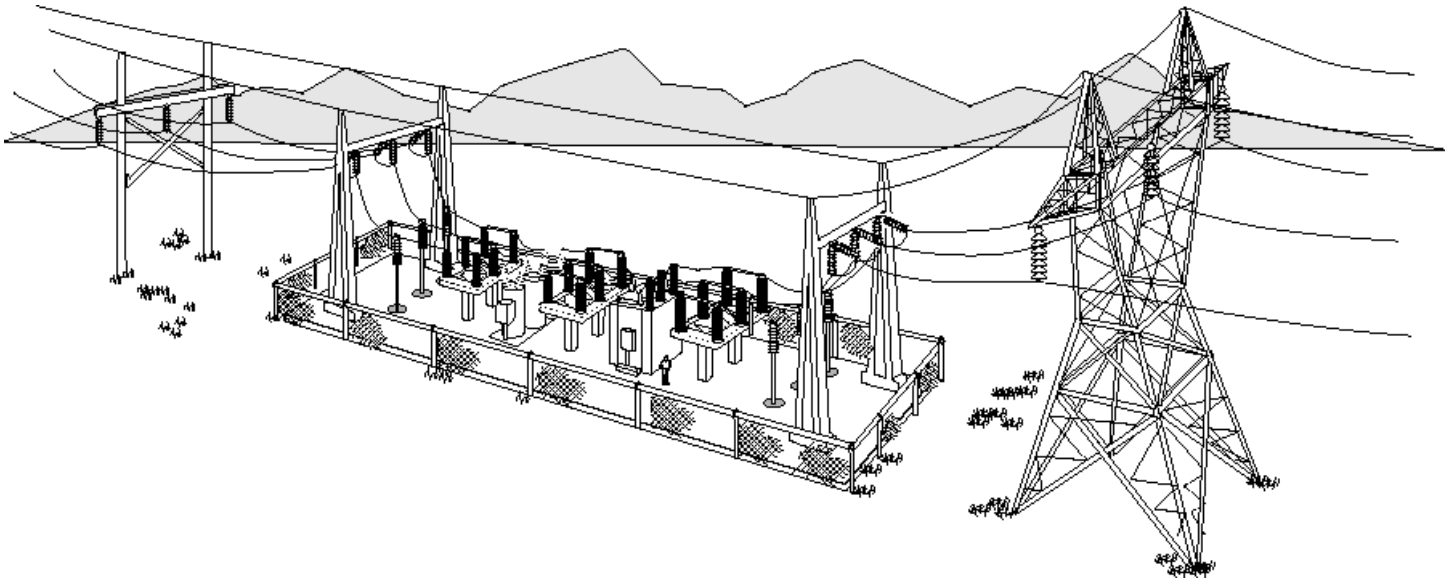
Volume 2 of 3

SECTION C
DESCRIPTION/SPECIFICATIONS

PROJECT SPECIFICATIONS

OLINDA-MAXWELL
OPGW INSTALLATION



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SECTION C

DESCRIPTION/SPECIFICATIONS
OLINDA-MAXWELL OPGW INSTALLATION

DIVISION 1 - GENERAL REQUIREMENTS

A. CONTRACT REQUIREMENT:

Construct and complete the Olinda-Maxwell overhead optical ground wire (OPGW) installation, in accordance with the Construction Contract (Standard Form 1442); the Contract Clauses; Western Construction Standards, including Standard 1 - General Requirements (July 2009), Standard 2 - Sitework (July 2009), Standard 3 - Concrete (July 2009), Standard 4 - Substation Metalwork and Transmission Line Lattice Structures (July 2009), Standard 9 – Substation - Electrical (July 2009), Standard 10 - Transmission Line - Electrical (July 2009), Standard 13 - Environmental Quality Protection (July 2009), Standard 15 Drawings (July 2009); standard drawings; and these project specifications and drawings.

If a conflict occurs between the project specifications and the construction standards, the project specifications shall govern. The project specifications and the drawings are used to take exceptions or provide additions to the standard specifications. Some paragraphs in the standard specifications will not apply to this job.

The standards and standard drawings are available at http://www.wapa.gov/business/buys.htm.

Western project specifications and standards are explained in Standard 1 - General Requirements, Section 1.1.1 “Standards and Project Specifications”.

B. DESCRIPTION OF WORK:

The principal components of work includes furnishing and installing fiber optic ground wire peaks on existing lattice steel structures, 82.1 miles of OPGW complete with splice boxes and associated fiber optic work at two substations. The work also includes removal of approximately 3000 feet of 1/2 inch overhead ground wire (OGW).

Paragraphs “Description of Bid Items” in Divisions - 1, 2, 3, 4, 9, and 10 describe the work to be performed.

The work is located between Olinda and Maxwell, California, as shown on drawings KE-ELV D 0003 through 0006.

C. DESCRIPTION OF BID ITEM:

1. **Bidding Schedule item “Mobilization and preparatory work”** includes the following:

a. Performing mobilization and preparatory work in accordance with Section H of the contract clauses.

b. Providing a Construction Program and a Safety and Health Program.

c. Providing a written Helicopter Operations and Safety Program.

d. Providing a Pulling Plan for OPGW.

2. SPECIAL INSTRUCTIONS REGARDING SITE VISITS: Because of the inherent risks associated with aviation operations, the Contractor is requested to contact the COR before undertaking any aviation activity near or around transmission lines and substations.

3. HELICOPTER OPERATIONS: Any questions regarding Helicopter Operations, or relating to the Standard Specifications, Standard 1, Section 1.4.13 Helicopter Operations, shall be directed to the COR.

D. COMMENCEMENT, PROSECUTION, AND COMPLETION OF WORK:

1. COMMENCEMENT AND COMPLETION: Begin work within 10 calendar days after date of receipt of Notice to Proceed, and complete all work within 180 calendar days from date of receipt of such notice.

2. SUBMITTAL APPROVAL TIME: Except as otherwise provided for specific submittals, Western will require 20 calendar days for review of drawings or data submitted for approval.

3. OUTAGE RESTRICTIONS: In addition to the restrictions listed in the standard specifications, the following outage restrictions shall apply:

a. Olinda/O'Banion and Keswick/O'Banion 230 kV double circuit:

(1) No outages on the Keswick/O'Banion or Olinda/O'Banion 230 kV transmission lines will be available between May 1, 2010 and September 15, 2010.

(2) One concurrent 90-day continuous outage on the Keswick/O'Banion or Olinda/O'Banion 230 kV transmission lines will be allowed between September 15, 2010 and December 30, 2010. The start of the outage will be dependent on system conditions.

(3) If required for emergency purposes, the Olinda/O'Banion and Keswick/O'Banion lines shall be restored by the Contractor within a maximum of 8 hours from the notice.

4. CONSTRUCTION SCHEDULE RESTRICTIONS: The pulling of the fiber must be completed between the dates of September 15th through December 30, 2010 and shall be subject to the following requirements:

a. Pulling of the OPGW fiber shall be performed under de-energized conditions.

b. Any structural modifications of towers performed prior to September 15, 2010 shall be performed under energized line conditions.

c. Access to and work on or around towers shall comply with the environmental requirements indentified in Division 13 of this Specification and the Standard Specifications as applicable.

5. MAXIMUM AVAILABLE FAULT CURRENT: When protective ground leads are required, the protective ground leads shall be sized to carry the maximum available fault current in accordance with the Standard 1 - General Requirements, Section 1.4 "Safety and Health" and the following:

a. The maximum available fault current is 28,500 amps.

E. CONSTRUCTION PROGRAM:

1. SUBMITTAL TIME: Submit a construction program to the COR within 30 calendar days after date of Notice to Proceed.

F. MATERIAL: Furnish all material for completing the work.

G. RIGHTS-OF-WAY:

1. GENERAL: Transmission line right-of-way is 160 feet for the Olinda to Maxwell line section. Western does not represent that the Contractor can gain access to every structure site or travel continuously along the transmission line. Orient construction methods and equipment to utilize Government-furnished rights-of-way or obtain additional temporary access or staging areas without additional cost to Western. Any additional temporary access or staging areas acquired by the Contractor shall have prior COR approval since several areas of the transmission line have travel restricted areas. During the contract period, Western reserves the right to use Contractor-obtained access.

2. ACCESS EASEMENTS: Western has acquired access easements from existing public roads to the transmission line and some off right-of-way access along the transmission line. This off right-of-way access route is to provide access to the transmission line structure sites not accessible by traveling the transmission line.

3. WORK ON THE RIGHT-OF-WAY:

a. General: Perform work on the rights-of-way necessary for access to or along the transmission line. Only that excavation, dozing, or blading that is absolutely necessary will be allowed. Excavation, dozing, and blading for ease of travel may only be performed after field review and approval by the COR. Unauthorized excavation, dozing, or blading shall immediately be repaired by the Contractor. Otherwise, Western will have the damage repaired and back-charge the Contractor for all costs involved. The Contractor is responsible to pay the land owners for any damages and notify Western of all damage claims and payments.

b. Ease of Travel and Crane Landings: Excavation, dozing, or blading done for ease of travel on any easement or for crane landings shall be restored to the original contour of the land and shall be compacted to a dry density not less than the natural in-place dry density of the surrounding earth. The use of water may be required to obtain the required density. Topsoil shall be stockpiled and spread on cuts prior to completion of work.

c. Landowner Coordination: Contractor shall coordinate with the underlying landowners and minimize impact to landowners operations as much as practicable.

H. GEOLOGIC INVESTIGATIONS:

Geologic information has not been obtained for this project and none is known to exist. The Contractor shall determine the nature of material to be excavated, the difficulties of making and maintaining required excavations, and doing other work affected by geology and ground water elevations at the work site.

I. ELECTRIC POWER FOR CONSTRUCTION PURPOSES:

Electrical receptacles in all the substations are available for use by the contractor. Higher voltages and electric power needs while working outside these facilities will be the responsibility of the contractor to provide.

J. WATER FOR CONSTRUCTION PURPOSES:

Furnish water for construction purposes. Make arrangements for obtaining the water, and provide for conveying the water to the points of use.

K. EXPLOSIVES AND BLASTING:

Explosives shall not be used.

L. SUBMITTALS:

1. GENERAL: The Contractor shall furnish submittals as specified in the construction standards and the project specifications.

2. APPROVAL TIME: Approval time for submittals shall be in accordance with the "Commencement, Prosecution, and Completion of Work" paragraph.

3. ADDRESSES: The Contractor shall transmit submittals to the following addresses:

a. COR:

Western Area Power Administration
ATTN: G5610 Gary Lachvayder
P.O. Box 6457
Phoenix, AZ 85005-6457

b. Electrical Engineer:

Western Area Power Administration
ATTN: A7910, Ross Clark
P.O. Box 281213
Lakewood, CO 80228-8213

c. Civil Engineer:

Western Area Power Administration
ATTN: A7920, Doug Hanson
P.O. Box 281213
Lakewood, CO 80228-8213

d. Control Systems Engineer:

Western Area Power Administration
ATTN: A7930, Dan Hamai
P.O. Box 281213
Lakewood, CO 80228-8213

e. Environmental Specialist:

Western Area Power Administration
ATTN: N1417, Ami Goerdt
114 Parkshore Drive
Folsom, CA 95630

f. Project Manager:

Western Area Power Administration
ATTN: N5520, Bob Silva
114 Parkshore Drive
Folsom, CA 95630

DIVISION 2 - SITEWORK

A. GENERAL: The transmission line is in cultivated fields, orchards, grazing, and open lands.

B. DESCRIPTION OF BID ITEMS:

1. Bidding Schedule item "Removing steel strand overhead ground wire" includes removing 3070 feet of steel strand overhead ground wire with four tension and one suspension assembly. Items removed from the existing line may not be reused in constructing the new line. The Contractor shall dispose of materials designated for removal in accordance with applicable environmental requirements.

2. Bidding Schedule item "Demolition" includes the following:

a. Remove steel as shown on drawings 43-203S4 2200, 43-203A4 2200, and 43-203W4 2201. The number of steel towers is shown in Table 2-1.

TABLE 2-1 - Number of Towers with Removal Steel

New Tower Name	Original Tower Name	No. of Towers	Estimated Unit Wt (lbs)
203S4	DSL	356	44
203A4	DSAL	4	48
203W4 and W5	DTL and DTL-1	6	48

3. Bidding Schedule does not contain separate items for the following. Include these items in applicable Bidding Schedule items.

a. Clearing as directed by the COR.
b. Grading for structure and tower sites and line clearance as directed by the COR.
c. Excavations for foundations.
d. Disposing of excavated material.

DIVISION 3 - CONCRETE

A. GENERAL:

1. MATERIAL:

a. Cement: Type IIA cement.

b. Compressive Strength: 4000 psi at 28 days.

c. Water-Cement Ratio: Net water-cement ratio, exclusive of water absorbed by the aggregates, shall not exceed 0.52 by weight.

d. Type A&D water-reducing and retarding admixtures may be used if approved by the COR.

e. Fly Ash: Fly ash shall be used to replace cement. Weight of fly ash shall not exceed 20 percent of the total cementitious material required; e.g., (fly ash weight/(fly ash weight + cement weight)) x 100 equal to or less than 20. Exceptions to its use are listed in Standard 13 - Environmental Quality Protection.

2. Test for Potential Reactivity of Sand and Coarse Aggregate: Perform test for each source used. Perform tests for potential reactivity for the sand and coarse aggregate to be used by the Contractor. If the tests determine the aggregate(s) to be unsuitable as a concrete aggregate, a suitable source shall be obtained by the Contractor.

B. DESCRIPTION OF BID ITEM:

1. **Bidding Schedule item "Concrete pull boxes and duct bank"** includes providing concrete duct bank, precast pull boxes, complete with gravelfill, covers, pulling hooks, other accessories, as shown drawings MXL 1700 and MXL 1701.

DIVISION 4 - TRANSMISSION LINE STRUCTURES

A. DESCRIPTION OF BID ITEM:

1. **Bidding Schedule item "Fiber optic ground wire peaks"** includes providing galvanized fiber optic ground wire peaks as shown on drawings 43-203S4 2201, 43-203A4 2201, and 43-203W4 2202. The number of fiber optic ground wire peaks is shown in Table 4-1.

TABLE 4-1-Fiber Optic Ground Wire Peaks

New Tower Name	Original Tower Name	No.	Unit Weight (lbs)
203S4	DSL	356	532.1
203A4	DSAL	4	528.9
203W4 and W5	DTL and DTL-1	6	802.3

a. Measurement: Measurement for quantities will be made on the basis of black weights calculated in accordance with the latest edition of "AISC Code of Standard Practice".

b. Fiber optic ground wire peak weights, calculated as noted above, are shown in Table 4-1 and payment will be based thereon.

2. ORIENTATION: Orientate fiber optic ground wire peaks to point to the inside of the line angle. (See Photographs 1 and 2 below)

Photograph 2: Ground Wire Peak Installation

Photograph 2: Ground Wire Peak, Installed

B. GOVERNMENT-FURNISHED DRAWINGS:

Western will furnish, within 30 days following contract award, one reproducible of bills of materials, shop detail, and erection drawings listed in Table 4-2.

TABLE 4-2--GOVERNMENT-FURNISHED DRAWINGS

New Tower Name	Original Tower Name	Shop Drawing File Numbers
203S4	DSL	43-203S4 2300 and 2400
203A4	DSAL	43-203A4 2300 and 2400
203W4 and W5	DTL and DTL-1	43-203W4 2300 and 2400

Table 4-2 drawings shall be used to fabricate material. Check drawings carefully, particularly with respect to possible exceptions from the Contractor's standard notations and practice. The Contractor shall have complete responsibility for proper fit of members.

At least one fiber optic ground wire peak of each tower type shall be field installed before fabricating the remaining fiber optic ground wire peaks. The field installation shall assure correct fit of parts, adequate bolt lengths, and proper field erection.

Prints of representative drawings are available for inspection from the Civil Engineer. Prints of erection drawings and bills of materials and a representative example of detail drawings will be furnished to prospective bidders upon request at $5.00 per print, nonrefundable.

DIVISION 9 – SUBSTATION – ELECTRICAL

A. DESCRIPTION OF BID ITEMS:

1. **Bidding Schedule item "Associated and miscellaneous substation electrical equipment and material"** includes providing equipment, material, and services required to expand as necessary, and complete the following substation installations as shown on the drawings:

    a. Grounding system.
    b. Electrical conduit system including embedded and exposed conduit.

2. **The Bidding Schedule item "Furnishing and installing fiber optics"** includes determining lengths, furnishing and installing the fiber optic duct cable (FODC) and innerduct, terminating the FODC, and connecting it to the patch panels at Olinda and Maxwell Substations.

    a. Material: All fiber optic communication equipment shall be commercially manufactured off-the-shelf items.

        (1) The FODC shall be as follows:

            (a) Optical Cable Corporation's DX024DSLX9KR (24 fiber, single mode, riser rated), and DX048DSLX9KR (48 fiber, single mode, riser rated) or equivalent. The 24 fiber cable will be installed at Olinda Substation, and the 48 fiber cable shall be installed at Maxwell Substation.

            (b) The fibers shall have no factory splices in any continuous length. Each continuous length of cable shall be wound on a separate reel. The end of each length of cable shall be sealed so no moisture can enter the cable. The cable shall be wound onto the reel so it can be pulled off without binding, kinking, or other problems.

            (c) All optical fibers for the FODC and pigtails shall be compliant with ITU-T G.652D single-mode fiber.

        (2) Furnish and install flexible inner duct for the FODC. Install FODC in inner duct where not in conduit. This includes, but is not limited to cable installed in cable trays, cable trench and under raised computer floor. Inner duct shall be corrugated (for maximum flexibility), orange, have a 1 inch inner diameter and have a preinstalled pull tape. Innerduct shall be UL listed and designed for riser applications per NEC article 770.182 and resistant to the spread of fire per UL 2024, Vertical-Tray Flame Test (Riser). Install couplers and connectors to attach inner duct to conduit and to neatly terminate the installation.

        (3) Cable Termination: Fibers shall be terminated with factory assembled pre-connectorized pigtails. The pigtails shall be compatible with the FODC single mode fiber, have 900 micrometer buffer tubes and be at least 3 meters in length before splicing. Pigtails installed in Olinda and Maxwell shall have single mode SC connectors with an average insertion loss not to exceed 0.25 dB and return loss not less than 35 dB.

        (4) Fiber Optic Patch Panel: The fiber optic patch panels at Olinda and Maxwell Substations are either existing or will be furnished and installed by Western. The patch panels are/will be Bejed fiber optic distribution unit BJ-1866A-001 for the termination of up to 144 single mode fibers and will include the necessary splice trays and the appropriate adapters (see above paragraph).

b. Installation:

(1) Install optical splice enclosure on the take-off-structure at the Olinda Substation according to substation drawings.

(2) Install 24 fiber FODC at Olinda Substation. Install the FODC from the optical splice enclosure on the take-off-structure, through conduit and cable trench, to the optical patch panel in the control building. At Maxwell Substation, the 48 fiber FODC shall be installed from structure 96/4 to the patch panel in the control building. At structure 96/4, FODC shall be wound on the coil storage bracket with the OPGW in an equal amount. The FODC shall be installed in inner duct at any point where it is not in a conduit. This includes, but is not limited to, cable installed in cable trench/trays and under raised access floors. Reference service building drawings for each site for the location of the communication rack/patch panel in which the fiber will terminate. At Olinda, the fiber shall terminate in Rack B4, fiber distribution unit (patch panel) No. 2, positions 49-72. At Maxwell, the fiber shall terminate in the fiber distribution unit in Rack A3, positions 1-24 for fiber coming from Olinda and positions 25-48 for future fiber coming from O'Banion Substation.

FODC termination at the fiber optic patch panel: Every fiber shall be terminated with factory assembled pre-connectorized pigtails. The pigtails shall be compatible with the FODC single mode fiber, have 900 micrometer buffer tubes and be at least 3 meters in length before splicing. Pigtails installed in Olinda and Maxwell shall have SC connectors with an average insertion loss not to exceed 0.25 dB and return loss not less than 35 dB.

(3) All fiber termination and splicing shall be done in order in accordance to the industry standard color coding (ANSI/TIA-598-C-2005).

(4) Optical Fiber Splices (applies to all splicing): All fiber splices shall be fusion spliced and have mechanical protection for each splice. The maximum **bidirectionally-averaged** splice loss shall be 0.10 dB.

(5) Splicing the FODC to the OPGW and testing the completed installation is included under the Bidding Schedule item for furnishing and installing the OPGW.

c. Fiber Optic Communication Drawings and Data:

(1) All drawings and technical data required to be furnished by the Contractor shall be in English, and all dimensions on the drawings shall be in feet and inches, and all weight in pounds. The drawings and data shall be complete and accurate in their content. Originals and all copies shall be legible.

(2) Western shall have the right to require the Contractor to make any changes in the drawings and data that may be necessary to show the equipment furnished conforms to the requirements of these specifications. The design and coordination of the fiber optic communication equipment shall be the responsibility of the Contractor and Western assumes no responsibility to approve or review drawings and data that are submitted.

(3) The following table summarizes the drawings and data required under these specifications.

Drawings and Data Schedule for Fiber Optic Material

Type of Drawings and Data	Delivery Time	Type of Material	Quantity to A7910	Quantity to N5520	Quantity to COR
Material Data	40 days after first notice to proceed	Catalog Sheets	1	1	2

DIVISION 10 – TRANSMISSION LINE ELECTRICAL

A. DESCRIPTION OF BID ITEMS:

1. **Bidding Schedule items for furnishing and installing overhead optical ground wire assemblies; complete with suspension clamps, armor rod and tension clamps for 0.465-inch diameter, overhead optical ground wire** include furnishing material and performing work and tests to provide overhead optical ground wire assemblies shown on drawing 41 1031 except that suspension clamps shall be sized for the OPGW and armor rods. Suspension armor rods shall be sized for the 0.465-inch-diameter OPGW. An estimate of material quantities for each type of structure is shown on drawing KE-ELV D 1015.

   Armor rods for 0.465-inch diameter, 24 count, OPGW shall be:

   Rod wire diameter.....0.167 inch
   Overall maximum diameter of installed rods .....0.799 inches
   Direction of lay.....right
   Rods per set 10
   Overall diameter of overhead ground wire .....0.465 inches
   Armor rod color code .....Green

2. **Bidding Schedule item for "Furnishing and installing one 0.465-inch diameter, 24-fiber overhead optical ground wire"** includes furnishing, stringing, sagging, clipping, and testing the OPGW, as described; and furnishing and installing all material not listed in other bid items to complete the OPGW wire installations in accordance with the standards and specifications.

   The OPGW shall contain twenty-four (24) single mode optical fibers. All optical fibers shall be equivalent with Corning type SMF-28e single-mode fiber with a maximum attenuation of 0.35dB/km at 1310nm and 0.20dB/km at 1550nm. OPGW will meet all IEEE-1138 Standard requirements.

   It will be the responsibility of the contractor to determine reel lengths, pulling lengths and pulling locations for the entire project. No pulling site shall be located in any of the environmentally sensitive areas shown in the maps provided. All pulling locations and pulling lengths shall be submitted to the COR at the same time the Construction program and Safety and Health program are submitted.

   a. The OPGW will have the following characteristics:

      (1) Overall diameter not greater than 0.465 inches.
      (2) Rated breaking strength not less than 16,300 lbs.
      (3) Weight not greater than .304 lbs/ft.
      (4) Fault current not less than $43(kA)^2$sec.

   b. Design sag and tension of the new OPGW was based on the NESC Light Loading Criteria, an example of which is shown below:

      Maximum Initial Tension = 3,000 lbs.:
      Ruling Span = 1,150 ft.
      Maximum Final Sag = 30 ft. at 30 degrees, 9 psf wind, no ice.
      Maximum Final Sag = 28.8 ft. at 60 degrees, 0 psf wind, no ice.

   c. Stringing shall strictly adhere to procedures recommended by the manufacturer. Ensure that the allowable bending radius of the fiber optic cable is not exceeded at any time. The OPGW shall be routed down and attached to take-off structures and structures at splice

locations as shown in drawings ODA 1196, 41 1027 and 41 1028 using guide clamps shown in drawing 41 1030.

d. Optical Fiber Splices: All fiber splices shall be fusion spliced and have mechanical protection for each splice. The maximum bi-directionally averaged splice loss shall be 0.10 dB.

e. Fiber Optic Testing: Perform fiber optic testing in accordance with the following:

(1) Factory Tests of OPGW and FODC: Factory tests shall be performed on each fiber of every reel at the factory. Results shall be recorded and included in the packaging with the cables. Product data sheets showing the cable characteristics including dispersion, dimensional quality, and tensile strength shall be provided from the manufacturer.

(2) Pre-installation Field Tests of OPGW and FODC: The Contractor shall test all fibers of each reel of OPGW upon delivery. Notify the COR at least 7 days prior to all pre-installation field tests to enable Western observers to be present. Contractor shall submit optical time domain reflectometer (OTDR) charts at both 1310 nm and 1550 nm showing launch conditions and all other parameters used in setup, plus time and date. These charts shall illustrate and quantify the losses of each length of fiber and stress points on the fiber. Review the traces carefully and explain unusual discontinuities in detail. Photographs of OTDR test results will not be accepted. The OTDR testing and waveforms shall be stored on a compact disk, (CD), and included with the submittal. If the OTDR testing is performed using equipment other than Wavetek or Tektronics, the Contractor shall supply Western with the software necessary to view the test results. All pre-installation tests on OPGW shall be compared to the factory test results. If the overall attenuation for a fiber increases by more than 1 dB, the reel will be rejected.

(3) Post-Installation Field Tests: Contractor shall notify the COR at least 7 days prior to the post-installation field tests to enable Western observers to be present. These tests shall include:

(a) OTDR charts at both 1310 nm and 1550 nm showing launch conditions and all other parameters used in setup, plus time and date. These charts shall illustrate and quantify the losses at each splice, length of fiber and stress points on the fiber. Review the traces carefully and explain unusual discontinuities in detail. Photographs of OTDR test results will not be accepted. OTDR measurements shall be made in both directions for all fiber paths. **Bidirectional averaged values shall be clearly displayed in a separate chart that identifies each splice location by tower number and direction of measurement**. Bi-directionally averaged splice loss shall not exceed 0.10 dB. OTDR results shall be submitted for every fiber of the completed fiber system. Perform patch panel to bare ended fiber OTDR testing (Maxwell-96/4, FODC fibers 25-48) before sealing the splice box. This will require that the contractor splice a launch fiber to all bare-ended fibers. Perform end-to-end (patch panel-to-patch panel, Olinda-Maxwell) tests for each fiber after all splices have been completed, and all splice boxes have been returned to their permanent position. The OTDR testing and waveforms shall be stored on an optical disk and included with the submittal requirements. If the OTDR testing is performed using equipment other than Wavetek or Tektronics, the Contractor shall supply Western with the software necessary to view the test results.

(b) Continuity and attenuation at 1310 nm and 1550 nm using an optical loss test set (power meter) on each complete fiber path (Olinda-Maxwell), to quantify overall end-to-end losses. Total end-to-end losses, including fiber loss, patch panels, connectors and splices shall not exceed loss limit as specified in Table 10-1 below:

Table 10-1: Maximum Fiber Path Losses

Fiber Path	# Fibers	1310 (dB)	1550 (dB)
Olinda to Maxwell	24	50.0	30.1

(4) Instrument Calibration: All test equipment shall be calibrated with certification traceable to the National Institute of Standards and Technology relative to their intended use.

(5) Qualifications of Testing Personnel: The fiber optic tester shall have a minimum of one year testing and operations experience with the OTDR and optical loss test equipment used for tests required in this specification, and shall be able to use all necessary test equipment without reference to test equipment instruction books while performing the required tests specified herein. All personnel performing splicing shall be certified to do so by the Electronic Technician Association or equivalent training program.

f. Fiber Optic Communication Drawings and Data:

(1) All drawings and technical data required to be furnished by the Contractor shall be in English, and all dimensions on the drawings shall be in feet and inches, and all weight in pounds. The drawings and data shall be complete and accurate in their content. Originals and all copies shall be legible.

(2) Western shall have the right to require the Contractor to make any changes in the drawings and data that may be necessary to show the equipment furnished conforms to the requirements of these specifications. The design and coordination of the fiber optic communication equipment shall be the responsibility of the Contractor and Western assumes no responsibility to approve or review drawings and data that are submitted.

(3) The following table summarizes the drawings and data required under these specifications.

Drawings and Data Schedule for Fiber Optic Communication

Type of Drawings and Data	Delivery Time	Type of Material	Quantity to A7910	Quantity to N5520	Quantity to COR
Splice box - Material Data	14 days after notice to proceed	Catalog Sheets	1	1	3
Factory Test Results of OPGW and FODC	With shipment	Test Results	1	1	3
Pre-Installation Field Test Results of OPGW and FODC	14 days after receipt of equipment	OTDR Charts and Disk	1	1	3

Type of Drawings and Data	Delivery Time	Type of Material	Quantity to A7910	Quantity to N5520	Quantity to COR
Post-Installation Field Test Results	14 days after completion of tests	OTDR Charts and Disk	1	1	3
Certification of Splicing Personnel	14 days prior to fiber splicing	Copy of Certification	1	1	3

3. **Bidding Schedule item "Transmission line splice boxes complete with splices"** includes furnishing and installing the optical splice boxes and completing the splices on the various types of lattice steel structures, steel pole structures and substation take-off structures. The contractor shall also determine the number and location for optical splice boxes along the transmission line based on reel lengths and set-ups. Where possible, the contractor shall locate optical splice boxes at tension structures. If splices must be made on a suspension type structure approval from the COR is required prior to completing the work. Any additional costs, including tension assemblies and hardware, for splicing at suspension structures shall be the responsibility of the contractor. Government required optical splice boxes shall be located as shown on specification drawing KE-ELV-D 1015.

    a. The splice boxes for the ODA-MXL fiber optic path shall include optical splice organizers for at least 48 single mode fusion splices. All splice box organizers shall allow for sufficient bend radius for the fibers as recommended by the cable/fiber manufacturer.

    b. All splice boxes shall have at least three ports to accept incoming OPGWs and FODC or flexible conduit fittings. New optical splice boxes on the substation take-off-structure shall be mounted as described in drawing ODA 1196.

    c. The optical splice box shall be Preformed Line Product's Coyote Splice Case (8" x 22"), suitable for the required number of splices, including splice trays and splice case Defender (where required), or equivalent. Splice boxes shall be furnished with splice trays and predrilled end plates for the cable(s) and conduit entrance. The Contractor shall seal any unused openings in the end plate with a manufacturer's approved sealing assembly. Only the splice boxes mounted on transmission line structures (outside a substation) will require the Defender.

    d. All fiber splicing shall be done in order in accordance to the industry standard color coding (ANSI/TIA-598-C-2005). Reference drawing ODA-OBN 7300 for the order of splicing at structure 96/4.

4. **Bidding Schedule item "Stockbridge-type vibration dampers for 0.465-inch diameter, overhead optical ground wire"** includes determining the number of vibration dampers needed, furnishing material, and performing all work, including testing, required to furnish and install vibration dampers for overhead optical ground wire.

    a. Vibration Damper drawing KE-ELV D 1016 contains all the wire, span and tension data necessary for a damper manufacturer to provide recommendations for quantities and spacing for dampers. The Contractor should provide this specification paragraph and the damper drawing to the manufacturer for application recommendations and final spacing for attachment. The spacing should take into account the armor suspension units used in the suspension assembly.

    b. Regardless of the Manufacturer's recommendations, at least one damper shall be provided for each span, excluding substation approach spans.

5. **Bidding Schedule item "Spare parts"** includes furnishing the following material to Western's Elverta Maintenance Facility, 7940 Sorento Rd., Elverta, CA 95626:

   a. Material:

      (1) Parts for six (6) Type OPGW-TV optical overhead ground wire assemblies.

      (2) Parts for six (6) Type OPGW-SP optical overhead ground wire assemblies complete with armor rod.

      (3) One reel containing 6000 feet of the optical overhead ground wire referenced in Division 10.A.2. Factory and Pre-installation field tests shall be included with this reel.

DIVISION 13 – ENVIRONMENTAL QUALITY PROTECTION

A. GENERAL

The Bid Schedule does not contain separate items for this Division. The cost of compliance with the requirements of Division 13 shall be included into the applicable Bid Schedule items.

1. General Requirements

a. Contractor Furnished Data (See Section 13.1.1, 13.1.2, 13.1.4, 13.1.5, and 13.1.9 of Standard).

b. Environmental Requirements (See Section 13.2 of Standard and the Special Requirements Section, below, for more detail).

c. Landscape preservation (See Section 13.3 of Standard).

d. Preservation of Cultural Resources (See Section 13.4 of Standard).

e. Noxious Weed Control (See Section 13.5 of Standard).

f. Recycled Material Quantities (See Section 13.6 of Standard).

g. Use of Recovered Material and Biobased Material Products (See Section 13.7 of Standard)

h. Disposal of Waste Material (See Section 13.8 of Standard).

i. Contractor's Liability for Regulated Material Incidents (See Section 13.9 of Standard).

j. Pollutant Spill Prevention, Notification, and Cleanup (See Section 13.10 of Standard).

k. Prevention of Air Pollution (See Section 13.13 of Standard).

l. Prevention of Water Pollution (See Section 13.16 of Standard).

m. Conservation of Natural Resources (See Section 13.19 of Standard).

B. SPECIAL REQUIREMENTS

1. Coordination

a. The Contractor shall coordinate with the Contracting Officer's Representative (COR) when selecting splice points and staging areas in order to ensure avoidance of sensitive resources.

b. The Contractor shall notify the Environmental Specialist a minimum of 30 calendar days prior to the start of work in order to flag sensitive areas for avoidance, conduct a pre-work nest survey, and prepare for environmental awareness training.

c. All Contract employees shall attend the one-time environmental awareness training prior to the start of work. Any persons that do not attend the originally scheduled training shall complete the training and have an understanding of the required minimization measures prior to entering the Project area.

2. Environmentally Sensitive Areas

The Environmental Maps show the locations of all environmentally sensitive areas. The Contractor shall avoid all areas specified in this Section and shall comply with all requirements listed as follows:

a. **Rivers, Streams, Creeks, Swales, Marshes, Ponds, Lakes, and other watercourses** – Refueling of equipment must take place 300 feet or more from the edge of any watercourse. Vehicles and heavy equipment must remain on the established access roads. Western will flag for avoidance within 100 feet of these resources. No vehicle traffic, heavy equipment, ground disturbance, or staging is allowable within the flagged areas.

b. **Vernal Pools, Vernal Pool Grasslands, and Seasonal Wetlands** – Refueling of equipment must take place 300 feet or more from the edge of any wetland. Vehicles and heavy equipment must remain on the established access roads. Western will flag for avoidance within 250 feet of these resources. No vehicle traffic, heavy equipment, ground disturbance, or staging is allowable within the flagged areas.

c. **Rice Fields** – Vehicles and heavy equipment must remain on the established access roads. Western will flag for avoidance within 200 feet of these resources. No vehicle traffic, heavy equipment, ground disturbance, or staging is allowable within the flagged areas.

d. **Elderberry** – When off-road, vehicles and heavy equipment must remain a minimum of 100 feet away from any elderberry shrub. Western will flag these resources for avoidance. No vehicle traffic, heavy equipment, ground disturbance, or staging is allowable within the flagged areas.

e. **Other Environmentally Sensitive Areas** – These areas must be avoided by all vehicle traffic, heavy equipment, ground disturbance, or staging. Western will flag these resources for avoidance.

f. **Migratory Bird Treaty Act** – Most birds in California are protected from direct impacts by the Migratory Bird Treaty Act (MBTA). Nests are not marked on the maps due to the transient nature of birds' nesting habits. If work is proposed within the nesting period (February 1 to July 31) Western will conduct a pre-work nest survey and will notify the Contractor of those locations. Active nests that could be impacted by the work must be avoided by postponing work at those towers until the young have fledged. If new nests are discovered by the Contractor after work has begun, the Contractor must notify the Environmental Specialist and avoid impacts to those nests also.

DIVISION 15 – DRAWINGS

A. GENERAL:

The standard drawings are available at http://www.wapa.gov/business/buys.htm.

LOCATION MAP:

1. KE-ELV D 0003 – Rev C. – Keswick - Elverta NO. 1-2 – Key Map
2. KE-ELV D 0004 – Rev B. – Keswick - Elverta NO. 1-2 – Key Map
3. KE-ELV D 0005 – Rev B. – Keswick - Elverta NO. 1-2 – Key Map
4. KE-ELV D 0006 – Rev B. - Keswick-Elverta NO. 1-2 – Key Map

ELECTRICAL:

5. MXL 0015 – Location and Vicinity Map
6. ODA 0015 – Location Map
7. KE-ELV D 1015 – Rev. A - OPGW Material Quantities and Construction Overview
8. KE-ELV D 1016 – OPGW Vibration Dampers

CIVIL:

9. MXL 2000 – Rev B. FIO – Grading and Plot Plan (For Information Only)
10. MXL 2002 – Rev D. FIO – Foundation General Plan (For Information Only)

MAXWELL CAPACITOR SW STATION:

11. MXL 1000 – Rev. B EI – Arrangement Plan (Existing Installation)
12. MXL 1000 – Rev. C – Arrangement Plan
13. MXL 1500 – Rev. A FIO – Key Grounding Plan (For Information Only)
14. MXL 1510 – Rev. B EI – Grounding Plan (Existing Installation)
15. MXL 1510 – Rev. C – Grounding Plan
16. MXL 1700 – EI – Key Conduit Plan (Existing Installation)
17. MXL 1700 – Rev. A – Key Conduit Plan
18. MXL 1701 – Conduit Plan Sections and Details
19. MXL 4000 – Rev. E – Service Building Conduit, Arrangement & Grounding
20. MXL 7103-1 – Rev. E – Rack Layouts (A1-A6), Communications Area, Elevations (Sh. 1 of 4)

21. MXL 7170-1 – Fiber Distribution Unit, BEJED (Rack A3), Layout & Cross Connect Assignment (Sh. 1 of 2)

22. MXL 7170-2 – Fiber Distribution Unit, BEJED (Rack A3), Layout & Cross Connect Assignment (Sh. 2 of 2)

OLINDA SUBSTATION:

23. ODA 1000 – Rev. C EI – Arrangement Plan (Existing Installation)

24. ODA 1000 – Rev. D – Arrangement Plan

25. ODA 1020 – Rev. C EI – 230kV Area Plan (Existing Installation)

26. ODA 1020 – Rev. D – 230kV Area Plan

27. ODA 1155 – Rev. B EI – 230-kV Bay Y18 – Sections K-K and L-L (Existing Installation)

28. ODA 1155 – Rev. C – 230-kV Bay Y18 – Sections K-K and L-L

29. ODA 1196 – Fiber Optic Cable Mounting

30. ODA 1500 – Rev. A FIO – Key Grounding Plan (For Information Only)

31. ODA 1520 – Rev. B EI – 230kV Area - Grounding Plan (Existing Installation)

32. ODA 1520 – Rev. C – 230kV Area - Grounding Plan

33. ODA 1720 EI – 230kV Area – Conduit Plan (Existing Installation)

34. ODA 1720 – Rev. A – 230kV Area – Conduit Plan

35. ODA 4000 – Rev. E – Service Building Conduit, Arrangement and Grounding

36. ODA 7173-4 – Rev. I – Communications Area, Rack Layouts (B1 thru B5), Elevations (Sh. 4 of 5)

37. ODA 7233-2 – Fiber Distribution Unit #2, BEJED (Rack B4), Layout & Cross Connect Assignments (Sh. 2 of 3)

38. ODA 7233-3 – Rev. A – Fiber Distribution Unit #2, BEJED (Rack B4), Layout & Cross Connect Assignments (Sh. 3 of 3)

TRANSMISSION LINE STRUCTURES:

39. 43-203A4 2200 – 203A4 Tower – 55 and 70 Ft. Bodies

40. 43-203A4 2201 – 203A4 Tower – Fiber Optic Ground Wire Peak

41. 43-203S4 2200 – 203S4 Tower – 55 and 70 Ft. Bodies

42. 43-203S4 2201 – 203S4 Tower – Fiber Optic Ground Wire Peak

43. 43-203W4 2201 – 203W4 and W5 Tower – 50 and 70 Ft. Bodies

44. 43-203W4 2202 – 203W4 and W5 Tower – Fiber Optic Ground Wire Peak

45. ODA-OBN 7300 – Optical Splice Enclosure 96/4, Splicing Diagram

GIS ENVIRONMENTAL SITE AND ACCESS ROAD MAPS:

46. Environmental Resource and Access Road Maps 1 through 98

Message from the Administrator

Many words are written about commitment and policy concerning occupational safety and health programs. But until these words are put into action, they remain just words. We at Western believe that safety is not just a piece of paper but integrated actions in everyday work practices. Safety is a way of life at Western, a condition of employment. Our program is based on four points.

- Safety procedures or common sense must not be set aside by any employee, whether Federal or contract, to meet a project schedule or for personal convenience.

- Employees and contractors must believe that they have the right and the responsibility for identifying and taking action to reduce, if not eliminate, hazardous work environments and hazardous work practices.

- Managers and supervisors must lead by example and execute their responsibility to ensure each job is accomplished in a safe and healthful manner.

- Safety is a personal responsibility. Each individual makes the decision on what action to take to accomplish a task.

I am personally committed to a strong safety program and am asking you to join me in this commitment. Together we can make Western a safe place to work.

Timothy J. Meeks


DEPARTMENT OF ENERGY
UNITED STATES OF AMERICA